

Amendment to Claims

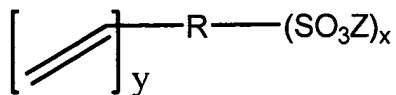
Please cancel Claim 24. Please amend Claims 25, 26 and 41-46. Please add new Claims 51 and 52. The Claim Listing below will replace all prior versions of the claims in the application.

Claim Listing

1-19. (Cancelled)

20. (Previously presented) A proton-conducting polymer membrane which is based on polyvinylsulphonic acid and is obtained by a process comprising the steps of:
- mixing a polymer, said polymer having solubility of at least 1% by weight in a vinyl-containing sulfonic acid, with a vinyl-containing sulphonic acid, and vinyl-containing phosphonic acid,
 - forming a flat structure using the mixture from step a) on a support,
 - polymerizing the vinyl-containing sulphonic acid and the vinyl-containing phosphonic acid present in the flat structure from step b), thereby forming an interpenetrating network,
- wherein the product obtained in step (c) comprises at least 10% by weight of polyvinyl-containing phosphonic acid, and
- characterized in that the membrane has an intrinsic conductivity of at least 0.001 S/cm at 160 °C.
21. (Previously presented) The membrane of Claim 20, characterized in that the polymer used in step a) is a high-temperature-stable polymer containing at least one nitrogen, oxygen, or sulphur atom in one repeating unit or in different repeating units.
22. (Previously presented) The membrane of Claim 20, characterized in that one or more polyazoles and/or polysulphones are used in step a).

23. (Previously presented) The membrane of Claim 20, characterized in that the mixture prepared in step a) contains compounds of the formula



where

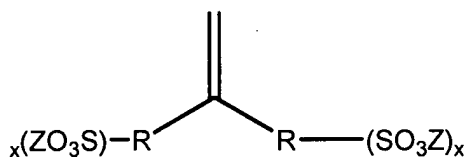
R is a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ, -CN, or NZ₂,

Z are each, independently of one another, hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, -CN,

x is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, and

y is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or

the formula



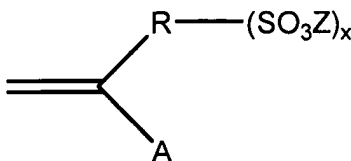
where

R is a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ, -CN, NZ₂,

Z are each, independently of one another, hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, -CN, and

x is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or

the formula

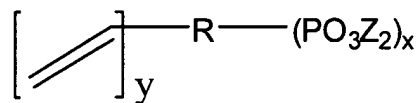


where

- A is a group of the formula COOR^2 , CN , CONR_2^2 , OR^2 , or R^2 , where R^2 is hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ , -CN, NZ_2 ,
- R is a bond, a divalent C1-C15 alkylene group, divalent C1-C15 alkyleneoxy group, or a divalent C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ , -CN, NZ_2 ,
- Z are each, independently of one another, hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, -CN, and
- x is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.

24. (Cancelled)

25. (Currently Amended) The membrane of Claim [[24]] 20, characterized in that the mixture prepared in step a) contains compounds of the formula

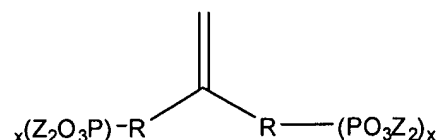


where

- R is a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ , -CN, NZ_2 ,
- Z are each, independently of one another, hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, -CN,
- x is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, and

- 5 -

y is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or the formula

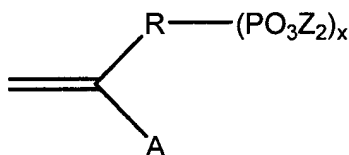


where

R is a bond, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ, -CN, NZ₂,

Z are each, independently of one another, hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, -CN, and

x is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10, or the formula



where

A is a group of the formula COOR², CN, CONR²₂, OR², or R², where R² is hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethylenoxy group, or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ, -CN, NZ₂,

R is a bond, a divalent C1-C15 alkylene group, divalent C1-C15 alkyleneoxy group, or a divalent C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, COOZ, -CN, NZ₂,

Z are each, independently of one another, hydrogen, a C1-C15 alkyl group, C1-C15 alkoxy group, ethyleneoxy group or C5-C20 aryl or heteroaryl group, with the above radicals optionally substituted by halogen, -OH, -CN, and

x is 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10.

26. (Currently Amended) The membrane of Claim [[24]] 20, characterized in that the weight ratio of vinyl-containing phosphonic acid to vinyl-containing sulphonic acid is in the range from 1:100 to 99:1.
27. (Cancelled)
28. (Previously presented) The membrane of Claim 20, characterized in that the polymerization in step c) is effected by means of a substance which is capable of forming free radicals.
29. (Previously presented) The membrane of Claim 20, characterized in that the polymerization in step c) is carried out by irradiation with IR light, NIR light, UV light, β -rays, γ -rays, or electron beams.
30. (Previously presented) The membrane of Claim 20, characterized in that the membrane comprises from 1 to 90% by weight of the polymer and from 99 to 0.5% by weight of polyvinyl-containing sulphonic acid.
31. (Previously presented) The membrane of Claim 20, characterized in that the membrane has a layer comprising a catalytically active component.
- 32-40. (Cancelled)
41. (Currently Amended) The membrane of Claim 20, wherein the mixture obtained in step (a) comprises at least 20% by weight of a vinyl-containing phosphonic acid, based on the total weight of the mixture.

42. (Currently Amended) The membrane of Claim 20, wherein the mixture obtained in step (a) comprises at least 30% by weight of a vinyl-containing phosphonic acid, based on the total weight of the mixture.
43. (Currently Amended) The membrane of Claim 20, wherein the mixture obtained in step (a) comprises at least 50% by weight of a vinyl-containing phosphonic acid, based on the total weight of the mixture.
44. (Currently Amended) The membrane of Claim 20, wherein the mixture obtained in step (a) comprises at least 5% by weight of a vinyl-containing sulfonic acid, based on the total weight of the mixture.
45. (Currently Amended) The membrane of Claim 20, wherein the mixture obtained in step (a) comprises at least 10% by weight of a vinyl-containing sulfonic acid, based on the total weight of the mixture.
46. (Currently Amended) The membrane of Claim 20, wherein the mixture obtained in step (a) comprises between 10% by weight and 97% by weight of a vinyl-containing sulfonic acid, based on the total weight of the mixture.
47. (Previously presented) The membrane of Claim 20, wherein the product obtained in step (c) comprises from 1% by weight to 70% by weight of polyvinyl-containing sulfonic acid.
48. (Previously presented) The membrane of Claim 20, wherein the product obtained in step (c) comprises from 5% by weight to 50% by weight of polyvinyl-containing sulfonic acid.

49. (Previously presented) The membrane of Claim 20, wherein the product obtained in step (c) comprises from 20% by weight to 95% by weight of polyvinyl-containing phosphonic acid.
50. (Previously presented) A proton-conducting polymer membrane which is based on polyvinylsulphonic acid and is obtained by a process comprising the steps of:
- mixing a polymer, said polymer having solubility of at least 1% by weight in a vinyl-containing sulfonic acid, with a vinyl-containing sulphonic acid, and vinyl-containing phosphonic acid,
 - forming a flat structure using the mixture from step a) on a support,
 - polymerizing the vinyl-containing sulphonic acid and the vinyl-containing phosphonic acid present in the flat structure from step b), thereby forming an interpenetrating network,
- wherein the product obtained in step (c) comprises from 0.5% to 99% by weight of polyvinyl-containing sulfonic acid and between 20% and 95% by weight of polyvinyl-containing phosphonic acid, and characterized in that the membrane has an intrinsic conductivity of at least 0.001 S/cm at 160 °C.
51. (New) A proton-conducting polymer membrane which is based on polyvinylsulphonic acid and is obtained by a process comprising the steps of:
- mixing a polymer, said polymer having solubility of at least 1% by weight in a vinyl-containing sulfonic acid, with a vinyl-containing sulphonic acid, and vinyl-containing phosphonic acid,
 - forming a flat structure using the mixture from step a) on a support,
 - polymerizing the vinyl-containing sulphonic acid and the vinyl-containing phosphonic acid present in the flat structure from step b), thereby forming an interpenetrating network,
- wherein the mixture obtained in step (a) comprises vinyl-containing phosphonic acid in the amount sufficient to impart onto the proton-conducting electrolyte

membrane obtained in step (c) the conductivity at temperatures of 160°C of at least 0.001 S/cm.

52. (New) A proton-conducting polymer membrane which is based on polyvinylsulphonic acid and is obtained by a process comprising the steps of:
- a) mixing a polymer, said polymer having solubility of at least 1% by weight in a vinyl-containing sulfonic acid, with a vinyl-containing sulphonic acid, and vinyl-containing phosphonic acid,
 - b) forming a flat structure using the mixture from step a) on a support,
 - c) polymerizing the vinyl-containing sulphonic acid and the vinyl-containing phosphonic acid present in the flat structure from step b), thereby forming an interpenetrating network,
- wherein the mixture obtained in step (a) comprises at least 20% by weight of a vinyl-containing phosphonic acid, based on the total weight of the mixture, and characterized in that the membrane has an intrinsic conductivity of at least 0.001 S/cm at 160 °C.